

Remarks

Amendments to the Claims

Claim 21 has been amended to recite a method of de-inking waste printed paper, comprising: (a) pulping at a pH between 3 and 8 waste printed paper with an enzyme capable of dislodging ink particles from the waste printed paper in an aqueous medium at a pH between 3 and 8, wherein ink is dislodged from the waste printed paper by action of the enzyme; and (b) removing the dislodged ink particles from the resulting pulp containing medium.

Claim 31 has also been amended to recite a method of recycling waste printed paper comprising: (a) pulping at a pH between 3 and 8 waste printed paper with an enzyme capable of dislodging ink particles from the waste printed paper in an aqueous medium at a pH between 3 and 8, wherein ink is dislodged from the waste printed paper by action of the enzyme; and (b) removing the dislodged ink particles from the resulting pulp containing medium.

Support for the amendments is found, for example, at page 6, lines 7-8, and original claim 8, of the priority application, U.S.S.N. 07/518,935 filed May 4, 1990 ("the '935 application"), claiming priority to Korean application 6514/1989 filed May 16, 1989. The Korean application is identical to the '935 application, with the exception of the paragraph found on page 6, at lines 25-27 of the '935 application, which was added to the Korean application. Support for the range 3 to 8 is found on page 8-2, last paragraph, line 6. A copy of the '935 application and the English translation of the Korean patent application are enclosed. Applicants are therefore fully entitled to the priority date of May 16, 1989, for the range of 3 to 8 in claims 1 and 3.

Claim 29 has been cancelled.

The phrase "a temperature of 20°C" in claim 30 was added May 13, 1991 by amendment. Claims 30, 32 and 40 have been amended to refer to "room temperature" (which could encompass of temperature of between about 20-25°C) and is therefore fully entitled to the priority date of May 16, 1989.

Support for "*Trichoderma viride*, *Aspergillus niger* or mixtures thereof" in claims 26 and 35 can be found, for example, at page 6, lines 19-23 of U.S.S.N. 08/239,313 which was filed on May 6, 1994 (the '313 application"). Therefore claims 26 and 35 are entitled to a priority date of May 6, 1994.

The phrase "pH 3 to about 7" and "pulping at an acid or neutral pH" was not originally disclosed in 07/518,935 but is found at page 6, lines 6-7 of the '313 application. Claims 27 and 37 have been amended to define the aqueous medium where caustic soda is not added. This is fully supported by the priority date of May 16, 1989, at page 8-2, paragraph 6, lines 4-5. Claims 41 and 47 have been amended to recite a pH range of between 3 and 8 and are therefore fully entitled to the priority date of May 16, 1989.

Rejection Under 35 U.S.C. § 102

a. Japanese Patent Document No. JP-A 59-9299

Claims 21-25, 27-34, and 36-47 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Japanese Patent

AMENDMENT AND RESPONSE TO OFFICE ACTION

Document No. JP-A 59-9299 published 1984 ("the '299 patent"). Applicants respectfully traverse this rejection

The '299 patent describes a de-inking agent that can be used for recycling of old paper such as newspapers and magazines. The de-inking agent contains a cellulase (page 2, 4th paragraph). Cellulases are commonly found in animals, plants, bacteria, and fungi. The '299 patent discloses that alkaline cellulases are especially preferred. The '299 patent defines an alkaline cellulase as one having an optimum activity between pH 8.0 and 11.5. Such enzymes retain their activity in the alkaline region as well as the acid and neutral range (bottom of page 2 to top of page 3).

The Examiner alleges that since the enzyme is active in acidic and neutral pH, it would have been obvious to use the cellulase over its entire range of activity, e.g. at acidic and neutral pH, even though the application states that the preferred pH optimum is 8.1 to 11.0 (last line, page 2). In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious **to one of ordinary skill in the art at the time of the invention**. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All

AMENDMENT AND RESPONSE TO OFFICE ACTION

words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The ‘299 patent discloses that alkaline cellulases retain their activity in the alkaline range as well as the acidic and neutral range. Examples 1-3 of the ‘299 patent all disclose the use of NaOH during the disintegration step. This would yield an alkaline pH (i.e., greater than pH 8.0).

The claims are drawn to a process of deinking at a pH between 3 and 8. The ‘299 patent does not disclose deinking at a pH between 3 and 8. The examiner is confusing the pH range of the enzyme with the pH range of the deinking process. However, it is the pH range of the deinking process that is in issue.

In Howard Kaplan’s declaration (copy enclosed as Exhibit A), which was submitted with the response filed on November 22, 2004 and a copy of which is enclosed with this response, it was shown that the pH of the reaction mixture described in Example 2 of the ‘299 patent was 10.6 (alkaline). Although the examiner indicates he is confused by what conditions were used, the conditions that were used were **exactly those described in Example 2 of the ‘299 patent.** **This is what the undersigned asked the examiner if the applicants should use, and the examiner had stated that was correct. It was also noted that it was impossible to do anything else, as requested by the examiner, since what the examiner was requesting was not disclosed in the ‘299 patent.**

AMENDMENT AND RESPONSE TO OFFICE ACTION

The Japanese Patent Office (JPO), in its Decision of Opposition to Patent (copy enclosed as Exhibit B), a registered copy of which was submitted with the response filed on August 11, 2004, found that there was no disclosure or suggestion of “pulping after controlling the pH in the range of 3 to 8, a part of the construction of the present invention....Thus the present invention cannot be constructed to be easily inventable by a person having ordinary skill in the art from the description of the ‘299 patent.”

The declarations of Drs. Eriksson and Eveleigh (copies enclosed as Exhibits C and D), dated March 19, 2004 and April 12, 2004, respectively, state that it is their understanding that the ‘299 patent discloses only the successful use of deinking enzymes with alkaline deinking chemicals such as sodium hydroxide. Dr. Eriksson cites an article from Paper and Pulp International (PPI) entitled “Neutral Deinking Makes Its Debut” (copy enclosed as Exhibit E) describing the breakthrough in October 1993 of deinking in neutral conditions, without the addition of alkalis such as sodium hydroxide to the pulp prior or during deinking. The declaration of Mr. Schmid (copy enclosed as Exhibit F), dated May 7, 2004, states that it is his understanding that there was no suggestion of non-alkaline deinking at the Zwingen plant prior to 1992.

In summary:

The ‘299 patent does not disclose deinking at a pH between 3 and 8. The ‘299 patent discloses deinking using an enzyme that has activity over a range of 3 to 11.

AMENDMENT AND RESPONSE TO OFFICE ACTION

The Japanese Patent Office Opposition Board found that the '299 patent did not disclose deinking of paper pulp with an enzyme at a pH of 3 to 8.

Those skilled in the art believed that it was believed that one could only deink at an alkaline pH at the time this application was originally filed.

Accordingly, the applicants have clearly shown that there was no suggestion in the prior art of enzymatic deinking at either a pH of 3 to 8 – i.e., at an acid or neutral pH. Accordingly, the claims are novel and inventive over the '299 patent.

b. Japanese Kokai 63-59494

Claims 21-25, 27-34 and 36-47 were rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103 (a) as obvious over Japanese Kokai 63-59494 ("JP '494").

The Examiner alleges that JP '494 discloses de-inking wastepaper using cellulose having a pH within the claimed range. The Examiner is directed to the declaration of Dr. Masahiro Samejima (copy enclosed as Exhibit G), dated March 5, 1996, which was submitted during prosecution of related application U.S.S.N. 08/239,313 ("the '313 application") as well as the letter from Mr. Kouichiro Takaku (copy enclosed as Exhibit H), a Japanese Patent Attorney, dated January 24, 1996, which was also submitted during prosecution of the '313 application. Dr. Samejima and Mr. Takaku both stated that the JP '494 patent state that "Cellulase is inactivated in an alkali condition of pH 8 or more. On the other hand, as a deinking is performed in the alkali condition, conventional cellulase cannot use therefore."

AMENDMENT AND RESPONSE TO OFFICE ACTION

This can only be interpreted to state that the deinking described by the JP '494 is performed at a pH of greater than 8, i.e., under alkaline conditions.

The declarations also state that the Jp '494 says "On the other hand as a deinking is performed in the alkali condition, conventional cellulase cannot use therefor. However, in case alkali-resistant cellulase is used, it is activatable in the alkai condition. Therefore, if the deinking is performed by using alkali-resistant cellulase with a deinking agent (alkali), the deinking effect is improved due to the action of the enzyme." This clearly indicates that one must use a cellulase that is active at alkaline conditions.

However, the claim is drawn to

A method of de-inking waste printed paper, comprising

a) **pulping at a pH between 3 and 8 waste printed paper with an enzyme capable of dislodging ink particles from the waste printed paper in an aqueous medium at a pH between 3 and 8**, wherein ink is dislodged from the waste printed paper by action of the enzyme; and

b) removing the dislodged ink particles from the resulting pulp containing medium.

Note the requirement both of the pH of the pulping conditions and of the requirement that an enzyme be used which is active at a pH of 3 to 8. This is simply not disclosed by nor obvious from the JP '494

AMENDMENT AND RESPONSE TO OFFICE ACTION

c. WO 91/14819

Claims 21-25, 27-34 and 36-47 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103 (a) as obvious over WO 91/14819 to Baret *et al.* ("the '819 application").

As amended, all claims with the exception of claims 26 and 35 are fully entitled to a priority date of 1989. WO 91/14819 is therefore not prior art to claims 21-25, 27-34 and 36-47. Claims 26 and 35 have not been rejected over WO 91/14819.

Rejection Under 35 U.S.C. § 103

a. Japanese Patent Document No. JP-A 59-9299 with or without U.S. Patent No. 3,966,543 or U.S. Patent No. 4,618,400.

Claims 21-47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Document '299 alone or in combination with U.S. Patent No. 3,966,543 to Cayle *et al.* ("Cayle") or U.S. Patent No. 4,618,400 to Wood *et al.* ("Wood"). Applicants respectfully traverse these rejections.

As discussed above, the '299 patent does not disclose or suggest deinking at a pH between 3 and 8 using a cellulase that is active at a pH between 3 and 8. As defined by Webster's third New International Dictionary (pages enclosed), "between" is defined as "in intermediate relation to in respect to quantity, quality or degree". Accordingly, "a pH between 3 and 8" means a pH of greater than 3 and up to 8.

AMENDMENT AND RESPONSE TO OFFICE ACTION

Cayle describes a method for the treatment of paper *to facilitate its disintegration upon subsequent disposal* (col. 1, lines 4-6). The method comprises applying a dilute aqueous solution of an cellulase enzyme complex to the wet paper web during paper manufacture (col. 1, lines 23-30). The cellulase complex can be obtained from various natural sources and particularly microbial sources including *Trichloderma viride*, *Penicilium variable*, and *Myrothecium verrucaria* (col. 3, lines 12-17). Cayle does not disclose or even suggest a method for *de-inking* wastepaper at all let alone a method for de-inking waster paper at acidic or neutral pH. Cayle does not provide the elements missing from the '299 patent.

Wood describes a method for the de-inking of wastepaper which comprises converting the wastepaper to a pulp, contacting the pulp with an aqueous medium of *alkaline pH* containing between about 0.2 and 2 percent by weight, calculated on dry weight of the pulp, of a de-inking agent which is one or a mixture of certain thiol ethoxylate compounds, and treating the resulting pulp-containing medium to remove the suspended or dispersed ink (col. 1, line 57 to col. 2, line 12). Wood does not disclose an enzymatic method for de-inking wastepaper at acidic or neutral pH.

Therefore neither Wood nor Cayle make up for the deficiencies of the '299 patent.

b. GB 2,231,595 or WO 91/14819 in view of Japanese Kokai 63-59494

Claims 26 and 35 were rejected under 35 U.S.C. 103(a) as obvious over GB 2,231,595 ("the '595 application") or WO 91/14819 ("the '819 application") in view of Japanese Kokai 63-59494 ("the JP '494 patent").

AMENDMENT AND RESPONSE TO OFFICE ACTION

The '595 application is the equivalent of the parent application, 07/518,935 ("the '935 application"). The '595 application discloses a method for de-inking waste printed paper, comprising: a) pulping at a pH in the range of 3 to 8 waste printed paper with an enzyme capable of dislodging ink particles from the waste printed paper in an aqueous medium at a pH in the range of 3 to 8, wherein ink is dislodged from the waste printed paper by action of the enzyme. The '595 application does not disclose cellulases derived from *Trichoderma viride*, *Aspergillus niger* and mixtures thereof.

The '819 application discloses an enzymatic process for deinking waste paper, comprising the follow sequential steps: (a) pulping the wastepaper at a consistency above 8% in the presence of deinking chemicals *at a pH above 9.5*; (b) lowering the pH to 6-9.5 by addition of an acidifying agent and adding **alkaline cellulase**; (c) continuing the pulping and/or maceration at consistency above 8%; and (d) separating the ink particles from the pulp.

As discussed above, JP '494 discloses the use of an alkaline-resistant cellulase *under alkaline conditions (i.e. addition of sodium hydroxide)* to de-ink wastepaper. The JP '494 patent does not disclose or suggest a method of de-inking waste printed paper, comprising: a) pulping at a pH *in the range of 3 to 8* waste printed paper with an enzyme capable of dislodging ink particles from the waste printed paper in an aqueous medium *at a pH in the range of 3 to 8*, wherein ink is dislodged from the waste printed paper by action of the enzyme (see the declaration of Dr. Masahiro Samejima, dated March 5, 1996 and the letter from Mr. Kouichiro Takaku, dated January 24, 1996, copies of which are enclosed).

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AMENDMENT AND RESPONSE TO OFFICE ACTION

None of the cited art discloses the claimed cellulases derived from *Trichoderma viride*, *Aspergillus niger*. None of the prior art provides any motivation to obtain the claimed cellulases and combine them with the claimed process as applicants have done. None of the art cited by the examiner would lead one of skill in the art to modify what is disclosed to use the claimed enzymes, with a reasonable expectation of success. Therefore claims 26 and 35 are not obvious over the cited art.

Allowance of claims 21-28, 30-38, and 40-47 is respectfully solicited.

Respectfully submitted,



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